

Dec. 13, 1960

H. W. SEABURG

2,963,753

HANGING ARRANGEMENT FOR SLIDABLE VEHICLE DOORS

Filed Oct. 16, 1958

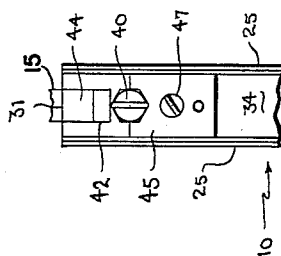
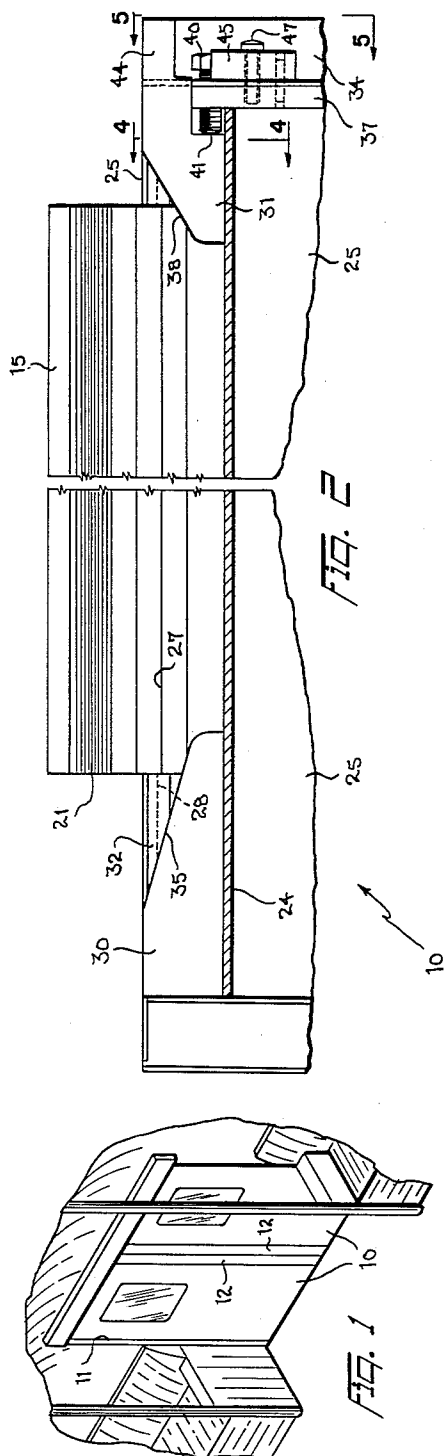


FIG. 3

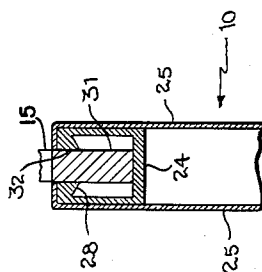


FIG. 4

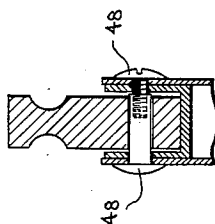


FIG. 5

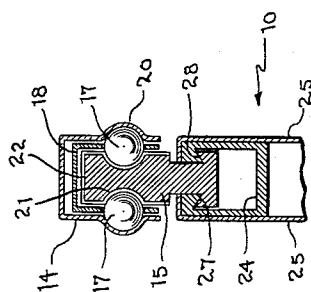


FIG. 6

INVENTOR.
HUGO W. SEABURG

BY

Richard van K. Bremer
Attorney

1

2,963,753

HANGING ARRANGEMENT FOR SLIDABLE VEHICLE DOORS

Hugo W. Seaburg, North Syracuse, N.Y., assignor to The O. M. Edwards Company, Inc., Syracuse, N.Y., a corporation of New York

Filed Oct. 16, 1958, Ser. No. 767,548

10 Claims. (Cl. 20—22)

This invention relates generally to mounting means for vehicle doors, and has particular reference to a greatly improved arrangement for hanging slidably operable doors such as used in subway cars, trains and the like.

In conveyances such as subway cars, the side and end doors are usually opened and closed by sliding the doors into and out of pockets in the car body adjacent the door opening. In most cases, these doors are hung on ball bearing hanger assemblies mounted above the door opening, the hanger assembly for each door having a depending horizontally slidable carrier member or stem which is connected to the plates at the top of the door by means of screws. This method of attaching the door to the carrier member has proved to be very troublesome whenever it is necessary to replace a door because the latter is unsupported at the bottom when hung and it is difficult to align the respective screw holes and insert the screws while at the same time holding the door in a raised position.

In addition to the difficulty encountered in attaching the doors to the hanger carrier members, which task usually requires at least two men, this method of connecting the parts has the disadvantage that the transverse stresses to which the doors are subjected, due to pushing crowds and the like, tend to loosen the screw connections so that there is an undesirable amount of lateral play. Moreover, since the connections are no stronger than the screws themselves, there is the possibility of a complete failure thereof if the screws become fatigued under the transverse stresses and bend or break.

With the foregoing and other considerations in view, the present invention contemplates and has as its primary object the provision of a hanging arrangement for a slidably operable vehicle door which greatly facilitates engagement of the door with and disengagement from the overhead hanger assembly, it being possible to effect such engagement and disengagement with a minimum expenditure of time and labor.

Another very important object is to provide a hanging arrangement for a slidably operable vehicle door wherein the weight of the door itself, and any transverse stresses to which it may be subjected, operate to force the connecting means between the door and hanger carrier member into tighter locking engagement.

A further important object of the invention is to provide a hanging arrangement for a slidably operable vehicle door which employs a structural connection between the door and carrier member, screws and like multiple connecting elements having been entirely eliminated.

A still further important object of the invention is to provide a hanging arrangement for a slidably operable vehicle door which is economical to manufacture and maintain.

A more specific object of the invention is to provide a hanging arrangement of the character described wherein the door and carrier member are equipped with complementary interlocking portions which are slidably engageable with one another.

Another specific object of the invention is to provide

2

a hanging arrangement of the character described wherein the interlocking portions of the door and carrier member are forced into tight engagement by novel wedging means mounted on the door.

Other objects and advantages of the invention will become apparent from the following detailed description thereof read in conjunction with the accompanying drawings which illustrate a representative embodiment of the invention for the purpose of disclosure.

In the drawings:

Figure 1 is a fragmentary perspective view of the interior of a subway car or the like showing slidably mounted side doors of the character described;

Figure 2 is an enlarged side elevation of the upper portion of a door and carrier member embodying the invention, one side plate of the door and one side of the channel member forming the top rail of the door being omitted to more clearly show the relationship between the carrier member and the door structure;

Figure 3 is a vertical transverse section taken substantially through the upper part of the door and hanger assembly for the door;

Figure 4 is a transverse section taken substantially along line 4—4 of Figure 2;

Figure 5 is a right end elevation of Figure 2 as indicated by line 5—5 thereof; and

Figure 6 is a transverse section through a conventional door and carrier member connection.

Having reference now to the drawings, wherein like reference numbers designate the same part in each of the views, Figure 1 shows the interior of a subway car having side doors 10 which are opened and closed by sliding movement in the longitudinal direction of the car, the doors being moved into and out of pockets 11 formed in the car body adjacent the door opening. As indicated at 12, the doors are provided at their meeting edges with the usual safety edge extensions of a yieldable material such as rubber. The doors are hung from the top and are unsupported at the bottom, the bottom edges thereof being equipped with conventional vertically adjustable guide plates (not shown) which are adapted to be received in a longitudinally extending groove or channel formed in the vehicle floor.

There is ordinarily one hanger assembly for each door, and these assemblies are mounted above the door opening and extend into the door receiving pockets adjacent the sides thereof. Each hanger assembly comprises an elongated track 14 secured by any suitable means to the car body, a depending carrier member or stem 15, bearing balls 17 and a ball retainer 18, see Figure 3. The balls roll in races or grooves 20, 21 formed in the sides of the track and carrier member respectively, whereby the member is freely slidable along the track. In the illustrated embodiment of the invention, the carrier is an extruded aluminum member and therefore the upper race portion thereof is encased in a wear resistant liner 22 of stainless steel or the like. It will be understood, however, that the carrier member can be made of solid steel or any other suitable material if desired.

The top rail of each door is an upwardly facing channel member 24 to which the side plates 25 of the door are fastened. In accordance with the invention, the carrier and channel members are provided with coacting means for connecting the door to the hanger assembly which comprise complementary inclined shoulders 27, 28 formed respectively on opposite sides of the carrier and in the interior of the channel as shown. The shoulders 27, 28 are brought into interlocking engagement as by sliding the carrier member into the channel and, as will be apparent from Figure 3, once the parts are engaged the downward force exerted by the weight of the door operates to tighten the connection.

In order to hold the shoulders 27, 28 in tight locking engagement with one another, and to insure against any relative sliding movement between the carrier member and door after they have been connected, the door is provided with a locking means which is adapted to act upon the carrier in the following manner. The locking means comprises a fixed wedge 30 which is mounted at one end of the channel member 24 and a movable wedge 31 which is removably positioned in the other end of the channel. The thickness of these wedges is such that they fit between the inner edges 32 of the channel shoulders 28, Figure 4, and the movable wedge 31 is slidable therebetween longitudinally of the channel.

When the door is being connected to the hanger assembly, the wedge 31 is removed from the channel altogether, as is the demountable side channel 34 to which the safety edge extension 12 is secured. This allows the carrier member to enter the channel at this end and be moved lengthwise therein until its inner end abuts against the inclined face 35 of the fixed wedge 30. Thereafter, the movable wedge 31, which is cut away at one side as shown, is dropped into position in the channel by tilting it down over the upwardly projecting end of a side structural member 37 and then sliding it horizontally to position its inclined face 38 beneath the outer end of the carrier member.

When the movable wedge has been positioned as above described, a screw 40 that is threaded through the upper end of the structural member 37 can be turned inwardly to abut against a vertical shoulder 41 on the wedge. Further turning of the screw then causes the movable wedge to be pushed inwardly towards the fixed wedge and this in turn forces the carrier member upwardly until the carrier and channel shoulders 27, 28 are in the tightest possible contact. In this connection, it will be seen in Figure 2 that the angle of inclination of the inclined face 35 on the fixed wedge is less than that of the inclined face 38 on the movable wedge which has the effect of forcing the fixed wedge engaging end of the carrier member upwardly before the driven end is forced up and thereby insures uniform engagement and tightness throughout the length of the member. In practical embodiments of the invention a fixed wedge having an angle of inclination of 15° and a movable wedge having an angle of inclination of 30° have proved satisfactory for this purpose.

After the carrier member and door channel have been locked in tight engagement as above described, the demountable channel 34 may be re-attached to the door, the channel being cut away as at 42, Figure 5, to permit an outwardly extending portion 44 on the movable wedge to pass therethrough. The purpose of the portion 44 is to enable the wedge to be tilted upwardly and disengaged by hitting it at this point if it remains wedged against the carrier member after the adjusting screw 40 has been withdrawn. In order to prevent the screw from working loose and backing off accidentally after it has been tightened to effect the wedging action, a keeper 45 which engages the screw head may be secured to the structural member 37 as by a screw 47.

With the above described arrangement, the connection between the door and carrier member cannot be loosened by the transverse stresses to which the door may be subjected because, if anything, these stresses will tend to increase the locking engagement, as does the weight of the door itself. Moreover, the connection disclosed is a structural connection employing durable structural members and does not rely upon a plurality of screws, such as are shown at 48 in Figure 6 illustrating a conventional arrangement, which screws must take the entire strain of any transverse stresses as well as the door weight. In addition to the increased strength of the hanging arrangement of the invention, the arrangement has the very important advantage, previously noted,

of ease of attachment whereby the parts may be slidably engaged and then locked in close, rigid contact.

As will be apparent to those familiar with the art, the invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The embodiment disclosed is therefore to be considered in all respects as illustrative rather than restrictive, the scope of the invention being indicated by the appended claims.

What is claimed is:

1. In an apparatus for slidably supporting a vehicle door including a hanger assembly mounted in the vehicle above the door, said hanger assembly having a slidably mounted depending carrier member, a channel member mounted at the upper edge of said door, coacting means on said channel and carrier member for connecting said door to said hanger assembly, said coacting means being slidably engageable to effect the connection, and wedge means on said door operable to force said coacting means into fixed locking engagement.

2. In an overhead support for a door adapted to be slidably mounted in a vehicle, a hanger assembly mounted in the vehicle above said door, said hanger assembly including a slidably mounted depending carrier member, means to connect said door to said carrier member for sliding movement therewith comprising interengaging structure on the door and member, and a pair of wedge members on said door and engageable with said carrier member to force said interengaging structure into fixed locking engagement.

3. Structure as defined in claim 2 wherein one of said wedge members is fixed and the other is movable.

4. Structure as defined in claim 3 wherein said wedge members are in the form of inclined planes having different angles of inclination.

5. In an apparatus for slidably supporting a door in a larger structure including a hanger assembly mounted in the structure above the door, said hanger assembly having a depending horizontally slidable carrier member, a channel member forming the upper rail of said door, coacting means on said channel and carrier members for connecting said door to said hanger assembly, said coacting means comprising slidably engageable complementary inclined shoulders on opposite sides of said carrier member and in the interior of said channel member, and wedge means on said door engageable with said carrier member to force said complementary shoulders into tight engagement and at the same time prevent further relative sliding movement between the door and member.

6. In an apparatus for slidably supporting a vehicle door including a hanger assembly mounted in the vehicle above the door, said hanger assembly including a slidably mounted depending carrier member, a channel member forming the upper rail of said door, coactable coupling means on said channel and carrier member for connecting said door to said hanger assembly, the coupling means on said carrier member being slidably engageable with the coupling means on said channel member to effect the connection, a portion of said carrier member extending into said channel member when said members are connected, a fixed and a movable wedge mounted in said channel member for engagement with the ends of the carrier member portion that is positioned therein, said wedges having inclined faces adapted to bear against the end edges of said carrier member, and means to drive said movable wedge towards said fixed wedge, said wedge movement being operable to force said carrier coupling means into tight locking engagement with said channel coupling means.

7. Structure as defined in claim 6 wherein the inclined face on said fixed wedge has a smaller angle of inclination than the inclined face on said movable wedge.

8. Structure as defined in claim 6 together with means on said door to hold said movable wedge in the position into which it has been moved by said drive means.

5

9. In an apparatus for slidably supporting a vehicle door at the upper end thereof including a hanger assembly mounted in the vehicle above the door, said hanger assembly including a depending horizontally slidable carrier member, an upwardly facing channel member forming the upper rail of said door, coacting means on said channel and carrier members for connecting said door to said hanger assembly, said coacting means comprising horizontally extending inclined shoulders on opposite sides of said carrier member and complementary shoulders formed in the interior of said channel member, said carrier and channel shoulders being slidably engageable to effect the connection, a portion of said carrier member extending into said channel member when said members are connected, a fixed wedge mounted at one end of said channel member, a movable wedge adapted to be positioned in the other end of said channel member after the members have been connected, said wedges hav-

6

ing inclined faces adapted to bear against the ends of the carrier member portion that is positioned within the channel member, and screw means on said door to drive said movable wedge toward said fixed wedge, said wedge movement being operable to force said carrier shoulders into tight engagement with said channel shoulders and at the same time to prevent further relative sliding movement between said channel and carrier members.

10. Structure as defined in claim 9 wherein the inclined face on said fixed wedge has a smaller angle of inclination than the inclined face on said movable wedge.

References Cited in the file of this patent

UNITED STATES PATENTS

554,932 Jaeger ----- Feb. 18, 1896

FOREIGN PATENTS

62,633 Denmark ----- Aug. 28, 1944